

Sea spray exposure to man: an initial risk-benefit assessment

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Recreational and psychological benefits of spending time along the shore or in coastal areas, i.e. the so-called “Blue Gym” effect, have long been recognized. The mechanisms responsible for beneficial physiological effects, as observed in epidemiological studies, are however still unclear. The biogenics hypothesis published by Moore (2015) states that the regular inhalation of marine natural products via sea spray aerosols (SSAs) is beneficial as these products directly or indirectly affect important health promoting cell signalling pathways. In previous studies we examined and demonstrated the effects of such respiratory SSA exposure, using in vitro experiments with lung cell-lines (Asselman, Van Acker et al., 2018).

Here, we aim to “translate” the results from these in vitro experiments, via a quantitative extrapolation, to realistic environmental air concentrations that would produce the same in vivo exposure and thus effects. Based on these and measured environmental concentrations, we attempt to assess the risks and benefits of SSA exposure for the different scenarios and endpoints we examined: (1) the effects of pure phycotoxins on cell viability and the mTOR cell signaling pathway and (2) the effects of a natural SSA extract on gene expression. The conclusions of this work provide an initial answer to the question whether sea spray exposure can be health promoting and if so what the minimal exposure should be. In other words, addressing the question: “how long do I need to be exposed to SSAs (e.g. a walk along the beach) to have beneficial health effects?”

Keywords: Biogenics hypothesis; Sea spray aerosols; In vitro in vivo extrapolation; Human risk and benefit assessment; Phycotoxins